

## *Glyphomerus aylax* sp. n. (Hymenoptera: Torymidae) from Bulgaria

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### ***Glyphomerus aylax* sp. n. (Hymenoptera: Torymidae) from Bulgaria. -**

The new species *Glyphomerus aylax* is described and illustrated on the basis of specimens that emerged from galls of *Aylax hypecoi* Trotter (Cynipidae) on *Hypecoum imberbe* (Hypecoaceae). A key to all species of *Glyphomerus* is presented. Biological notes of the new species are given.

**Keywords:** Hymenoptera - Torymidae - *Glyphomerus* - taxonomy - key to species.

## INTRODUCTION

*Glyphomerus* Förster, 1856 is a genus with 8 species (incl. the new species), mostly distributed in Palaearctics. Only *Glyphomerus stigma* (Fabricius) is recorded in Nearctics, where it probably was introduced from Europe. Bouček (1970) published a key and comments on the known species up to that time. Grissell (1995) gave a catalogue of species and diagnostic characters of the genus, and stressed on its basal position in the subfamily Toryminae. Zerova & Seryogina (1999a, b; 2000) reviewed *Glyphomerus* with descriptions of 3 new species, a redescription and keys.

Species of *Glyphomerus* have been reared from galls of Cynipidae (Hymenoptera) associated with Rosaceae, Asteraceae and Lamiaceae, and from Eurytomidae (Hymenoptera) galls on Poaceae.

## MATERIAL AND METHODS

*Glyphomerus aylax* sp. n. was reared from galls of *Aylax hypecoi* Trotter (Hymenoptera: Cynipidae) on *Hypecoum imberbe* Sibthorp et Smith (Hypecoaceae). Galls (Fig. 10) that developed in fruit tissues between seeds were stored under laboratory conditions and some of them were opened to study the trophic relationships.

Along with the new species, some chalcidoids, braconids and ichneumonids emerged from those galls. The specimens were air-dried and card-mounted.

Specimens used for scanning electron microscopy were dissected and glued with conductive paste LEIT-C. They were coated with a 150-200 Å gold layer and photographed using a Philips-515 SEM (25 kV; secondary electrons-mode).

The key of *Glyphomerus* species is based on previous keys in the literature, and also after studying of the specimens of *Gl. stigma*, *Gl. tibialis*, *Gl. europaeus*, *Gl.*

*carinatus*, *Gl. isosomatis* and *Gl. aylax* sp. n. *Gl. parvulus* and *Gl. montanus* are given in the key according to their original descriptions.

Terminology and abbreviations follow Grissell (1995) and Graham & Gijswijt (1998).

## DESCRIPTION AND DISCUSSION OF THE NEW SPECIES

### *Glyphomerus aylax* sp. n.

Figs 1-9

#### MATERIAL EXAMINED

*Holotype*: ♀, Bulgaria: Plovdiv, Dzhendem tepe locality – 165 m a. s. l., emerged 20-29.VI.2002 from gall collected 2.VI.2002, A. Stojanova. *Paratypes*: 99 ♀♀ and 68 ♂♂, same locality as holotype, A. Stojanova; collecting and emerging dates, number and sex of specimens are presented in Table 1.

Holotype and 10 paratypes are deposited in the collection of the Muséum d'histoire naturelle, Geneva. Ten paratypes are deposited in the collection of the Institute of Zoology, Ukrainian Academy of Sciences (Kiev) and 148 paratypes are deposited in the collection of the Department of Zoology, University of Plovdiv.

#### DIAGNOSIS

The following combination of features separates *Glyphomerus aylax* sp. n. from other species of the genus: 1) Malar space 0.38 to 0.4 times the length of the eye. 2) Antenna: female – F1 slightly elongate, F2-F5 quadrate, F6 and F7 slightly transverse; male – F1 and F2 slightly elongate, F3-F7 quadrate. 3) Marginal vein 1.2 times as long as postmarginal vein and 2.4 times as long as stigmal vein. 4) Ovipositor index 1.75 to 2.18. 5) Fore wing infumate with a macula below stigma and with dark stripes on cubital fold, and above the middle part of posterior margin.

#### DESCRIPTION

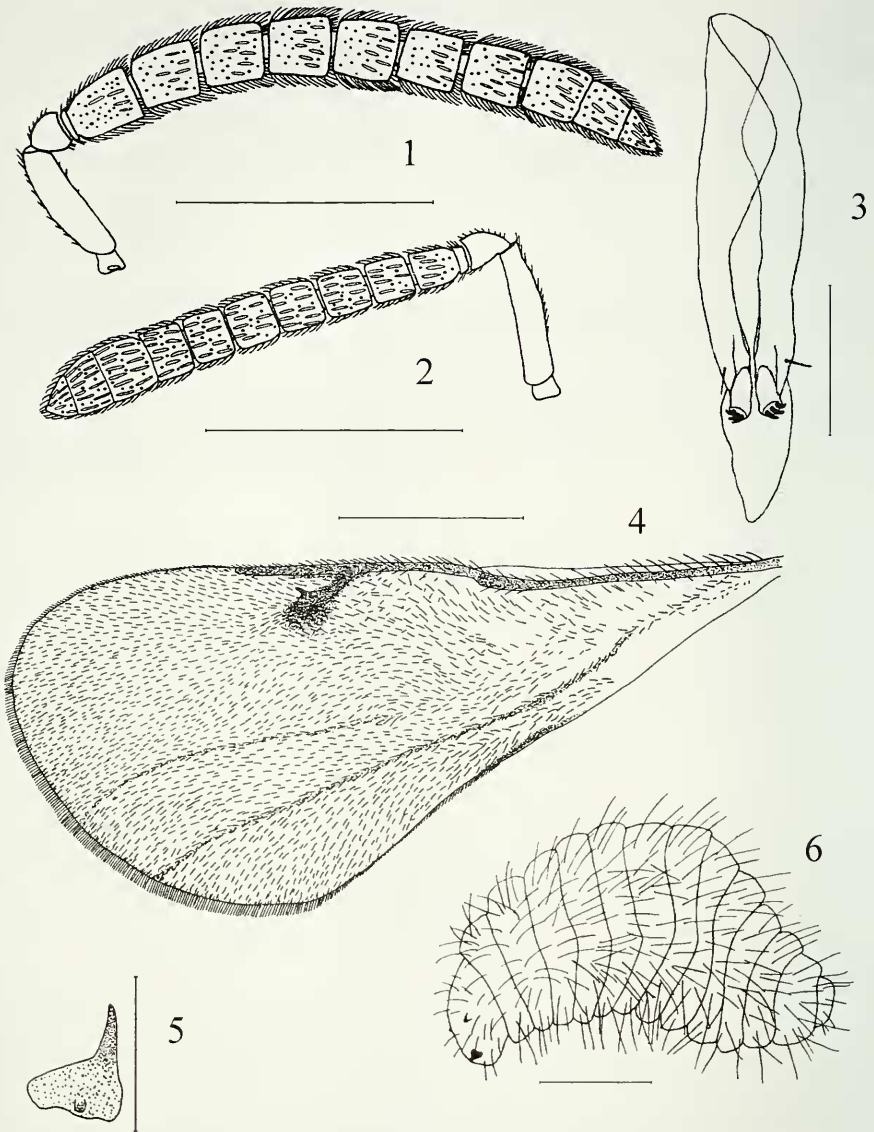
**FEMALE: Morphology.** Head with finely reticulate surface and moderately dense pubescence. Head in dorsal view 2.3-2.4 times as broad as long, temples 0.22-0.25 times length of eye. POL 2.1-2.3 times OOL, OOL 1.1-1.2 times OD. Head in frontal view (Fig. 7) subtrapezoid, with vertex slightly arched and straight genae. Anterior margin of clypeus straight, face protruding medially. Mouth 1.9-2 times length of malar space, the latter 0.38-0.45 times the length of eye. Eyes with sparse hairs. Scrobal depression shallow, not reaching anterior ocellus. Toruli (Fig. 7) well above lower ocular line, slightly nearer to clypeus than to lower edge of anterior ocellus. Antenna (Fig. 2) with scape 4.3 times as long as broad, not reaching anterior ocellus; pedicel 1.5 times as long as broad; anellus strongly transverse; F1 slightly elongate, F2 – F5 quadrate, F6 and F7 slightly transverse; clava twice as long as broad; sensilla numerous, arranged in 2 rows. Flagellum clothed with short, adpressed hairs.

Mesosoma (Fig. 8) with dorsal surface reticulate and shining; pubescence consisting of dense, rather short and slightly raised hairs on pronotum and mesoscutum, and longer hairs on posterior third of scutellum and on callus. Mesosoma short, about 1.25 times as long as the maximum height in lateral view; pronotum transverse, 2.7 times as broad as long on median line including neck. Mesoscutum 1.5 times as broad as long with notauli complete, superficial. Scutellum barely longer than wide, with subtruncate base and posterior margin with a carina. Propodeum (Fig. 9) finely

TABLE 1. Data of paratypes of *Glyphomerus aylax* sp. n.

Date of galls collecting	Emerging date	♀	♂
19.V.2001	10-15.V.2002	2	-
14.II.2002	31.V.2002	1	1
17.III.2002	19.IV.2002	-	1
28.III.2002	5.IV.2002	2	3
28.III.2002	23-29.IV.2002	2	5
28.III.2002	1-4.V.2002	11	-
28.III.2002	10-15.V.2002	-	1
28.III.2002	6.VI.2002	1	1
14.IV.2002	7.V.2002	1	1
19.IV.2002	12.V.2002	1	-
12.V.2002	7-10.VI.2002	2	3
12.V.2002	20-29.VI.2002	1	-
19.V.2002	30.V. -10.VI.2002	-	1
19.V.2002	10-14.VI.2002	-	3
19.V.2002	14-18.VI.2002	1	1
25.V.2002	14-18.VI.2002	1	-
29.V.2002	14-18.VI.2002	1	2
29.V.2002	19.VI.2002	-	2
29.V.2002	20-29.VI.2002	13	4
29.V.2002	7-10.V.2002	2	-
29.V.2002	14.V.2002	1	-
29.V.2002	21.V.2003	1	-
29.V.2002	27.V.2003	1	-
2.VI.2002	14-18.VI.2002	3	1
2.VI.2002	19.VI.2002	3	-
2.VI.2002	20-29.VI.2002	21	10
2.VI.2002	15.VIII.2002	-	1
2.VI.2002	21.IV.2003	-	1
2.VI.2002	7.V.2003	2	1
2.VI.2002	14.V.2003	1	-
9.VI.2002	14-18.VI.2002	-	2
9.VI.2002	20-29.VI.2002	4	4
9.VI.2002	5.III.2003	1	1
9.VI.2002	23.IV.2003	1	-
9.VI.2002	10.V.2003	1	1
9.VI.2002	14.V.2003	1	-
9.V.2003	28.V. -3.VI.2003	-	7
17.V.2003	4-11.VI.2003	2	3
17.V.2003	12-16.VI.2003	4	1
25.V.2003	4-11.VI.2003	1	-
25.V.2003	12-16.VI.2003	1	1
25.V.2003	17-20.VI.2003	2	-
2.VI.2003	12-16.VI.2003	1	-
2.VI.2003	17-20.VI.2003	-	3
2.VI.2003	22.VI. -5.VII.2003	7	2

reticulate; in median part 0.3 as long as distance between spiracles; median carina indistinct and submedian carinae incomplete. Mesepimeron 2.7 times as high as broad, smooth and shining (except for reticulate lower posterior half). Hind femora moderately strongly enlarged, 3.4 times as long as broad, slightly crenulate in apical part. Fore wing (Fig. 4) 2.4 times as long as broad; basal cell hairy except for a bare

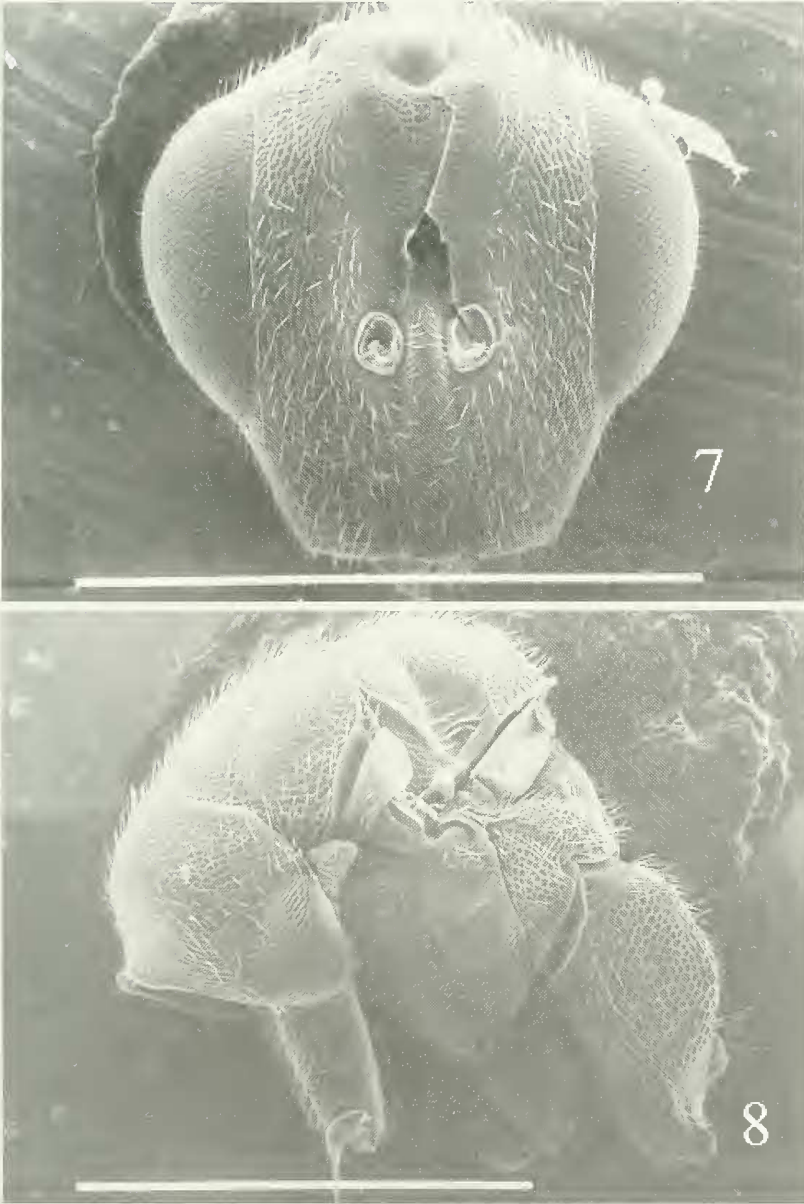


FIGS 1-6

*Glyphomerus aylax* sp. n. 1, 3 male: 1 - antenna; 3 - genitalia; 2, 4 female: 2 - antenna; 4 - fore wing; 5, 6 larva: 5 - mandible; 6 - last instar larva. Scale bars = 0.1 mm for mandible; 0.2 mm for genitalia; 0.5 mm for the others.

stripe along cubital hairline, speculum partly present; cubital fold with hairline. Fore wing venation: M: PM: ST as 36: 29: 15.

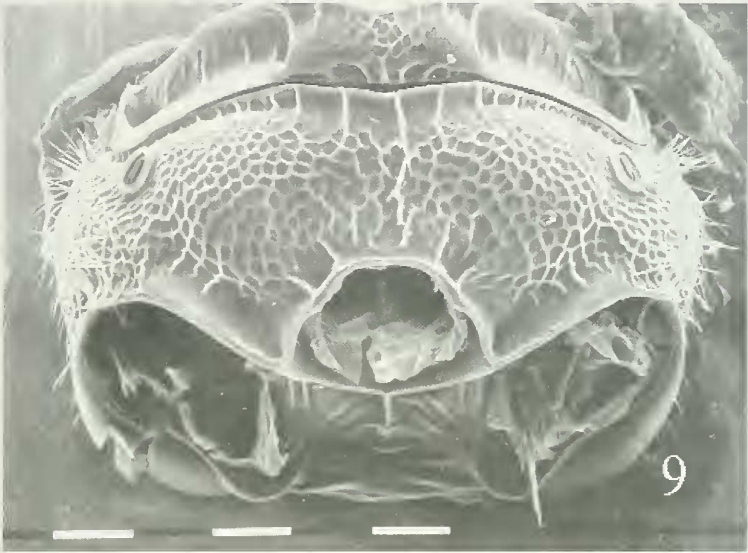
Gaster with puncture surface; pubescence consisting of dense hairs. Gaster 1.2-1.5 times the length of mesosoma. Tip of hypopygium extending 2/3 along gaster.



FIGS 7-8

*Glyphomerus aylax* sp. n.: 7 – head, frontal view; 8 – mesosoma, lateral view. Scale bars = 1 mm.

Ovipositor index (ratio length of ovipositor: length of hind tibia) 1.75-2.18 (except for one female with ovipositor index of 1.31). Ovipositor tilted upwards at an angle of about 40°-70° relative to imaginary line crossing petiolus and ovipositor base, but 3 females have almost vertical ovipositors.



FIGS 9-10

9 - *Glyphomerus aylax* sp. n., propodeum. Units of scale bar = 0.1 mm. 10 - Galls of *Aylax hypecoi* on *Hypocoum imberbe*. Scale bar = 10 mm.

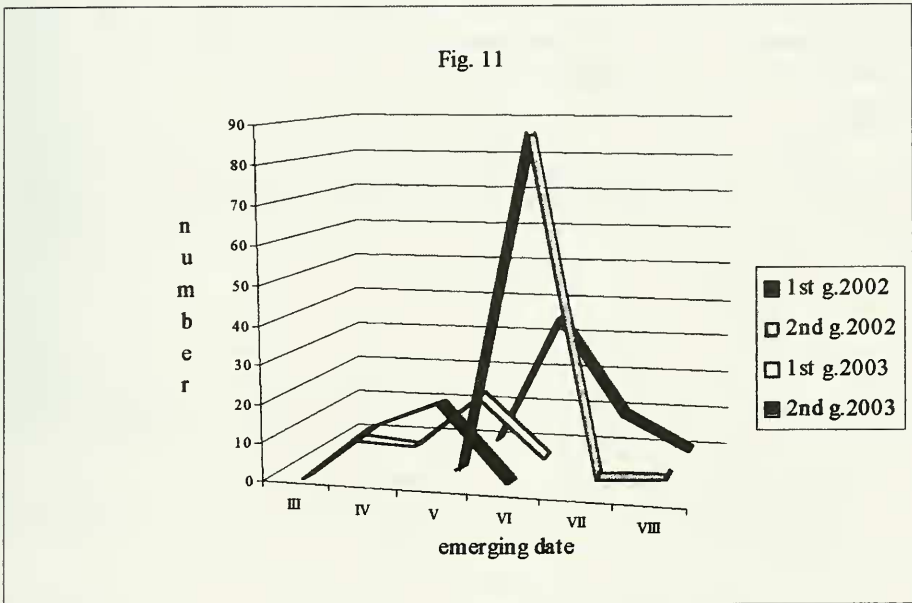


FIG. 11

Dynamic of number of first and second generations of *Glyphomerus aylax* sp. n.

Length 2.2-3.3 mm.

*Colour.* Dark bluish-green with bronze shine to brownish-black with weak violaceous metallic shine. Following structures brown: antenna (except for yellowish-brown base of scape), clypeus, lower face only lateral to clypeus; lateral part of gastral terga (first and second testaceous); hypopygium; ovipositor sheaths; inner surface of fore coxa, mid and hind coxae; femora (except for yellowish knees); hind tibia (except for yellowish apex); pretarsi. Fore and mid tibiae yellowish brown, tarsal segments yellow. Wings infumate, fore wings with a macula below the stigma (sometimes paler) and with dark stripes on cubital fold and above the middle part of posterior margin; veins and pubescence on wing disc dark brown.

*MALE: Morphology.* Differs from female as follows: antenna (Fig. 1) – scape cylindrical, without enlargement, 3.6 times as long as broad; pedicel about one third the length of scape; anellus strongly transverse; F1 slightly elongate, 1.3 times as long as broad, F2 subquadrate, F3-F7 quadrate (sometimes F2-F7 slightly transverse); clava 2.8 times as long as broad. Flagellum thickly clothed with short brown setae. Malar space 0.35-0.45 length of eye. Legs with hind femur 3.2 times as long as broad. Gaster oval, about as broad as mesosoma and 0.65-1.4 times the length of the latter. Genitalia (Fig. 3).

Length 1.4-2.85 mm.

*Colour.* Bronze-green with metallic shine to brownish-black with green metallic shine. Antennae dark brown; coxae and femora (except for testaceous knees)

concolorous with body, fore and mid tibiae yellowish, hind - brown. Fore wings with relatively weaker infumation and paler macula below stigma (smaller paratypes with almost hyaline wings and maculae hardly traceable).

#### BIOLOGY

*Glyphomerus aylax* sp. n. is a primary, solitary, ectophagous parasitoid of *Aylax hypecoi*, but secondary parasitism via chalcidoid (Eurytomidae: *Eurytoma aemula* Szelenyi, *Eurytoma jaceae* Mayr, *Eurytoma* sp.; Eupelmidae: *Eupelmus microzonus* Förster, *Eupelmus vesicularis* (Retzius), *Eupelmus* sp.; Pteromalidae: *Cyrtoptyx* sp.; Torymidae: *Exopristoides* sp.), braconid or ichneumonid species emerging from the same galls cannot be excluded.

The new species appears to be at least bivoltinous. Adults of first generation emerge between March and June (Fig. 11) from galls formed in the previous year (February, March and April); second generation emerge between May and August from galls collected in May and June of the same year. For five larvae of galls collected on 9.VI.2002 a prolonged diapause of about 2 years was established.

The fully-grown larva (Fig. 6) is ivory white and densely clothed with long hairs. The mandible (Fig. 5) is unidentate.

#### ETYMOLOGY

Named after the host.

#### DISCUSSION

The females of *Glyphomerus aylax* sp. n. are closely related to those of *Glyphomerus tibialis* (Förster) regarding the shape of first funicular segment slightly elongate; annelus transverse; malar space 0.38 to 0.45 times the length of eye; mesosoma short, about 1.25 times as long as the maximum height in lateral view and scutellum barely longer than wide; gastral terga densely punctured. The new species can be distinguished from *Gl. tibialis* in having marginal vein 1.2 times as long as the postmarginal vein and 2.4 times as long as the stigmal vein (*tibialis* has marginal vein 1.8 times as long as the postmarginal vein and 3 times as long as the stigmal vein). There are some more differences between both species: the second funicular segment in *Gl. tibialis* is elongate; the new species has F2 quadrate; the fore wing of *Gl. tibialis* has two maculae, whereas that of *Gl. aylax* sp. n. has one macula below the stigma and dark stripes on the cubital fold and above the middle part of posterior margin. *Gl. tibialis* has usually pale tibiae, whereas those of *Gl. aylax* sp. n. are yellowish brown.

The following characters: ovipositor index and coloration of the body vary greatly in both species and they are not reliable for distinguishing of them (ovipositor index varies in *Gl. tibialis* from 0.95 to 2.14 and in *Gl. aylax* sp. n. - from 1.75 to 2.18; the coloration of the mesosoma in *Gl. tibialis* varies from bluish green to green, and of the gaster - from black to brown with reddish base; the coloration of the mesosoma in *Gl. aylax* sp. n. varies from green with blue or bronze shine to brownish-black and of the gaster - from green to brown).

On the other hand *Glyphomerus aylax* sp. n. is related to *Glyphomerus isosomatis* Zerova et Seryogina in having similar shape of funicular segments two to seven, shape of anterior margin of clypeus, malar space: length of eye 0.38 to 0.45, and



ovipositor index. The new species differs from *Gl. isosomatis* in having: F1 slightly elongate (first funicular segment of *Gl. isosomatis* is distinctly transverse), the marginal vein 1.2 times as long as the postmarginal vein and 2.4 times as long as the stigmal vein (in *Gl. isosomatis* the stigmal vein is 0.45 times as long as the marginal vein, which is subequal in length with the postmarginal vein), and in having fore wing with one macula below the stigma and with dark stripes on cubital fold and above the middle part of posterior margin (*Gl. isosomatis* has two connected maculae below the stigmal vein and the parastigma).

## KEY TO THE SPECIES OF *GLYPHOMERUS* FÖRSTER

### FEMALES

- 1 Malar space short, 0.25 to 0.33 length of eye . . . . . 2
- Malar space 0.38 to 0.55 length of eye . . . . . 4
- 2 Pronotum in dorsal view with sides diverging anteriorly; anterior corners prominent, below the corners with deep holes laterally; propodeum with distinct median carina and incompleated submedian carinae. Ovipositor index 1.8. Body black with dark green gloss, scape dirty yellow, at least below . . . . . *Glyphomerus carinatus* Nikolskaya
- Pronotum in dorsal view with sides subparallel, no prominent corners and holes laterally . . . . . 3
- 3 Propodeum coarsly reticulate and with some curved wrinkles. Postmarginal vein 2 times as long as stigmal vein. Ovipositor index 2.25. Body black with bluish-green gloss. [Fore wing infumate with 2 maculae] . . . . . *Glyphomerus stigma* (Fabricius)
- Propodeum finely reticulate. Postmarginal vein 1.7 times as long as stigmal vein. Ovipositor index 2.35. Body dark bronze-green. [Fore wing with 2 maculae] . . . . . *Glyphomerus montanus* Zerova & Seryogina
- 4 Body testaceous; anellus elongate, flagellum very slender, F1 narrower and shorter than pedicel. Ovipositor index 0.45. Fore wing almost hyaline, not maculate . . . . . *Glyphomerus europaeus* (Erdös)
- Body bronze-green to black with bluish-green gloss; anellus transverse, flagellum stout, F1 at least as broad as pedicel. Ovipositor indexes much more than 0.5. Fore wing usually maculate . . . . . 5
- 5 F1 distinctly transverse . . . . . 6
- F1 subquadrate to slightly elongate . . . . . 7
- 6 F2-F7 subquadrate; clava as broad as funicle. Marginal and postmarginal veins subequal in length. Ovipositor index 1.85. Fore wing infumate with 2 connected maculae. [Stigmal vein about half as long as marginal vein] . . . . . *Glyphomerus isosomatis* Zerova & Seryogina
- F2-F7 distinctly transverse; clava broader than funicle. Marginal vein 1.3 times as long as postmarginal vein. Ovipositor index 4.07. Fore wing with one dark macula below stigma. [Stigmal vein about half as long as marginal vein] . . . . . *Glyphomerus parvulus* Zerova & Seryogina

- 7 Marginal vein 1.8 times as long as postmarginal vein and 3 times as long as stigmal vein. F2 slightly elongate. Fore wing not strongly infumate, with 2 maculae. Tibiae pale. [Ovipositor index 0.95 to 2.14]  
 ..... *Glyphomerus tibialis* (Förster)
- Marginal vein 1.2 times as long as postmarginal vein and 2.4 times as long as stigmal vein. F2 quadrate. Fore wing infumate, with macula below the stigma and with dark stripes on cubital fold and above the middle part of posterior margin. Tibiae yellowish brown. [Ovipositor index 1.75 to 2.18] ..... *Glyphomerus aylax* sp. n.

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#### REFERENCES

- BOUČEK, Z. 1970. On some new or otherwise interesting Torymidae, Ormyridae, Eurytomidae and Pteromalidae (Hymenoptera), mainly from the Mediterranean subregion. *Bolletino del Laboratorio di Entomologia Agraria "Filippo Silvestri" di Portici* 27: 27-54.
- GRAHAM, M. & GIJSWIJT, M. 1998. Revision of the European species of *Torymus* Dalman (Hymenoptera: Torymidae). *Zoologische Verhandelingen* 317: 202 pp.
- GRISSELL, E. 1995. Toryminae (Hymenoptera: Chalcidoidea: Torymidae): a redefinition, generic classification, and annotated world catalog of species. *Memoirs on Entomology, International* 57: 470 pp.
- ZEROVA, M. & SERYOGINA, L. 1999a. Review of Palaearctic *Glyphomerus* (Hymenoptera, Torymidae) species and description of two new species. *Zoologicheskyy Zhurnal* 78: 960-964. (In Russian).
- ZEROVA, M. & SERYOGINA, L. 1999b. Torymid chalcidoid wasps (Hymenoptera, Chalcidoidea, Torymidae) of tribes Podagronini and Monodontomerini of the Ukrainian fauna. *Vestnik Zoologii, Supplement* 13: 130 pp. (In Russian).
- ZEROVA, M. & SERYOGINA, L. 2000. New data on systematic and distribution of the *Glyphomerus* species (Hymenoptera, Torymidae). *Vestnik Zoologii* 34 (3): 95-98. (In Russian).